

# SPECIFICATION

MODEL : SPMAMB5204

Approved rank :  $V_F(S0)$ ,  $\lambda_D(E1,E2)$ ,  $I_V(S0)$

## AMBER LED

*SAMSUNG LED CO., LTD.*

314. MAETAN 3-DONG, YEONGTONG-GU,  
SUWON-SI, GYEONGGI-DO, KOREA, 443-743

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# 1. Product Outline

## 1) Feature

- . Lead Frame Type LED Package ( 5.2 \* 6.0 \* t 1.3mm )
- . Beam Angle (  $\Delta\theta$  : 120° )
- . AlGaInP Chip & Long Time Reliability

## 2) Applications

- . Indoor, Outdoor Display and etc.

# 2. Absolute Maximum Rating

- 1). Operation Forward Current Per Chip..... 30 mA
  - 2). Peak Pulsed Forward Current Per Chip..... 100 mA  
(Duty 1/10 Pulse Width 10msec)
  - 3). Reverse Voltage..... 10 V
  - 4). Operating Temperature Range (  $T_{opr}$  ) ..... -30°C ~ 85°C
  - 5). Storage Temperature Range (  $T_{stg}$  ) ..... -40°C ~ 100°C
- .  $I_{FP}$  Conditions : Duty 1/10 Pulse Width 10 ms

# 3. Characteristics

## Electrical/ Optical Characteristics

(  $T_a$  : 25°C )

Item	Symbol	Conditions	Rank	Min.	Typ.	Max.	Unit
Forward Voltage (*)	$V_F$	$I_F = 40 \text{ mA}$	S0	1.7	-	2.6	V
Reverse Current	$I_R$	$V_R = 5 \text{ V}$	-	-	-	100	$\mu\text{A}$

## Dominant Wavelength

(  $T_a$  : 25°C )

Item	Symbol	Condition	Rank	Model Name	Min.	Typ.	Max.	Unit
Dominant Wavelength (*)	$\lambda_D$	$I_F = 40 \text{ mA}$	GE	E1	SPMAMB5204N0S0E1S0	583		589
				E2	SPMAMB5204N0S0E2S0	589		595

## Luminous Intensity

(  $T_a$  : 25°C )

Item	Symbol	Condition	Rank	Min.	Typ.	Max.	Unit
Luminous Intensity (*)	$I_V$	$I_F = 40 \text{ mA}$	S0	800	-	-	mcd

- \* Tolerance :  $V_F$  ;  $\pm 0.1\text{V}$ ,  $\lambda_D$  ;  $\pm 2\text{nm}$ ,  $I_V$  ;  $\pm 10\%$
- \* Luminous intensity measuring equipment : CAS140CT

※ Approved Rank

$V_F$	$\lambda_D$	$I_v$
S0	E1, E2	S0

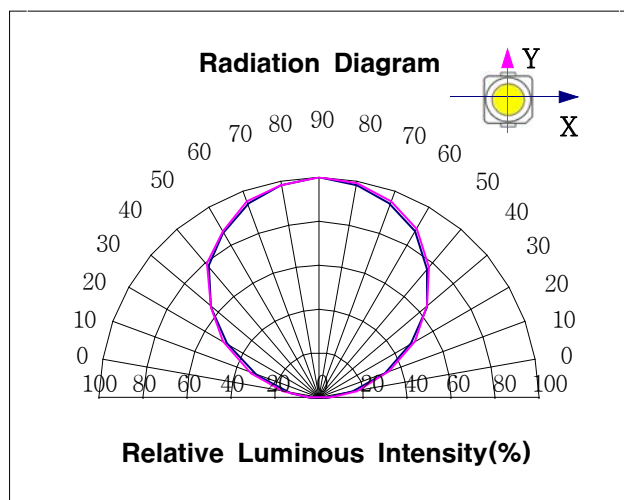
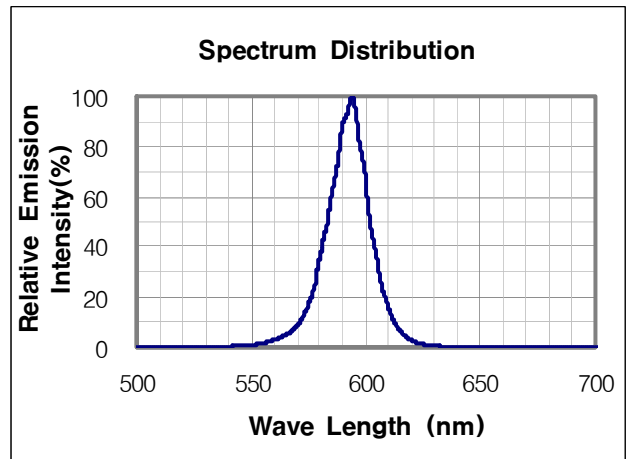
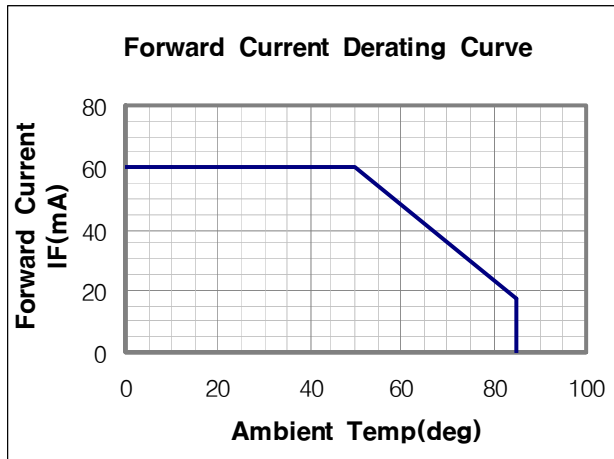
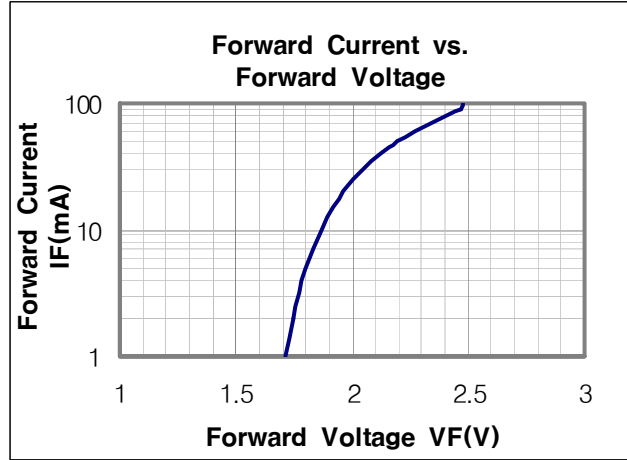
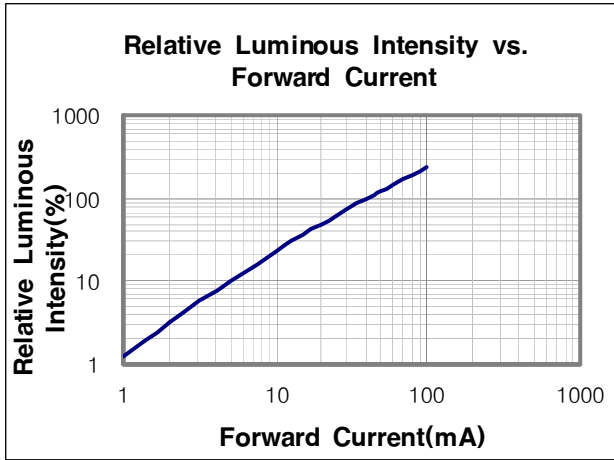
\* Each reel contains only one of the E1, E2 a segment (1/2) of the GE rank.

※ Special Approved Rank

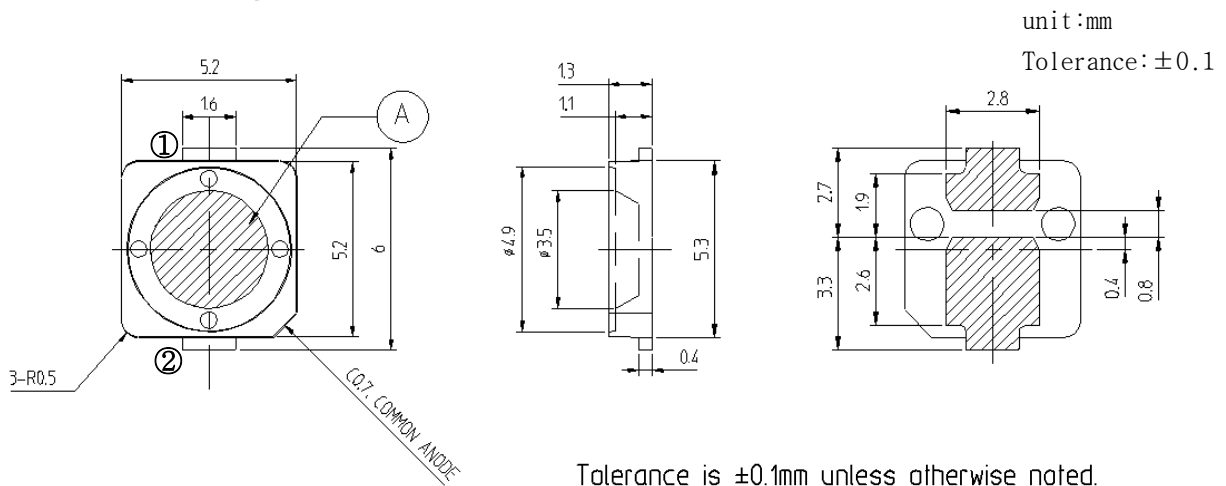
$V_F$	$\lambda_D$	$I_v$
-	-	-

# 4. Typical Characteristics Graph

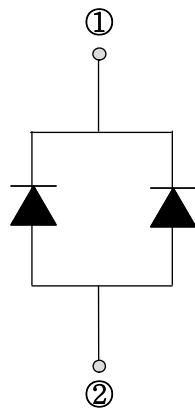
( Ta : 25°C )



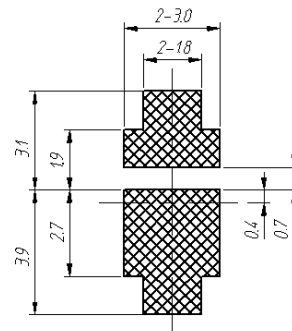
# 5. LED Package Outline Dimensions



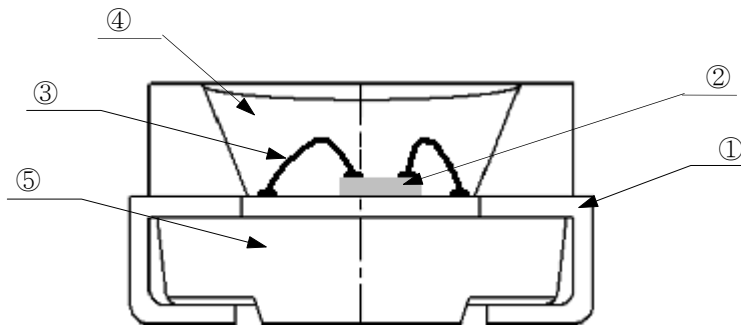
Tolerance is ±0.1mm unless otherwise noted.  
The maximum compressing pressure is 15N.  
Do not apply any damage on the phosphor ( "A" ).



Circuit Diagram



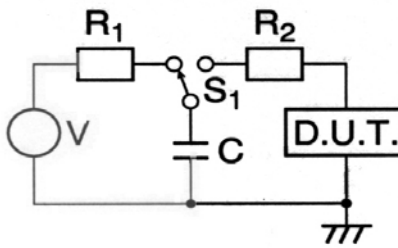
PCB PATTERN



NUMBER	ITEM	MATERIAL
①	FRAME	Copper Frame(Silver Plated)
②	LED CHIP	AlGaInP/AIn
③	WIRE	Gold Wire
④	RESIN	Resin
⑤	PACKAGE	Heat-resistant Polymer

## 6. Reliability Test Items and Conditions

### 1) Test Items

Test Item	Test Conditions	Test Hours/Cycles	Sample No
Room Temperature life test	25°C±3°C, DC60 mA	500 h	50
High Temperature humidity life test	60°C±3°C, 95%±2%RH, DC45 mA	500 h	50
High Temperature life test	85°C±3°C, DC17.5mA	500 h	50
Low Temperature life test	-30°C±3°C, DC60 mA	500 h	50
High Temperature Storage	Ta=100°C±3°C	500 h	22
Low Temperature Storage	Ta=-40°C±3°C	500 h	22
High Temperature humidity Storage	60°C±3°C, 95%±2%RH	500 h	22
Thermal Shock	-40°C ~ 100°C 0.5 h      0.5 h	100 cycles	50
Temperature humidity Cycle	25°C ~ 65°C ~ -10°C 24hrs/1cycle, 95%RH	10 cycles	22
Reflow (Pb-Free)	Peak 260±5°C for 10sec	3 times	22
ESD(HBM)	 <p>-R1:10MΩ , R2:1.5KΩ , C:100pF</p>	5 times	5
On/Off test	50°C±3°C, 95%±2%RH, DC60 mA, On/2sec, Off/2sec	108000 cycles	50

## 2) Criteria for Judging the Damage

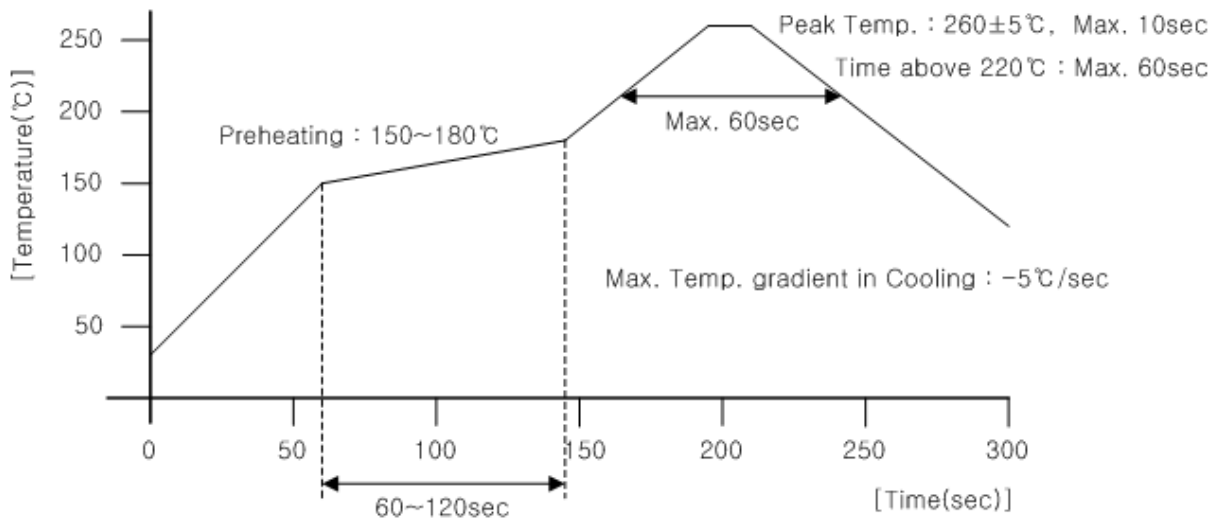
Item	Symbol	Test Condition	Limit	
			Min	Max
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 40mA	-	U.S.L.*1.2
Luminous Intensity	I <sub>V</sub>	I <sub>F</sub> = 40mA	L.S.L.*0.5	-

\* USL : Upper Standard Level    LSL : Lower Standard Level

## 7. Solder Conditions

### 1) Reflow Conditions ( Pb Free )

Reflow Frequency : 2 times max.

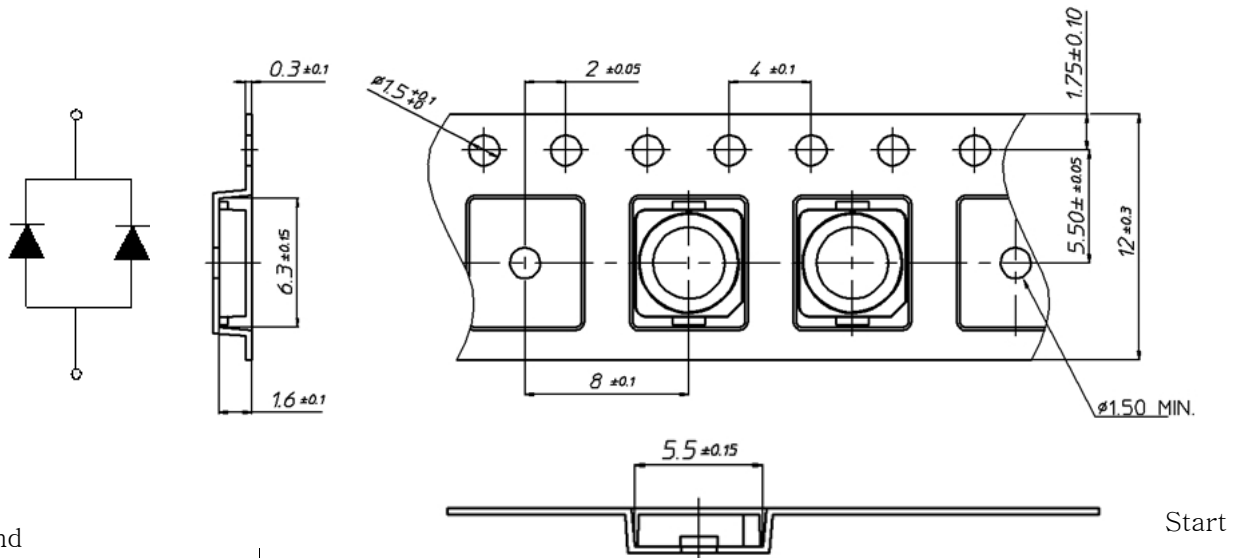


### 2) For Manual Soldering

Not more than 5 seconds @MAX300°C, under soldering iron.(one time only)



## 8. Taping Dimension



End

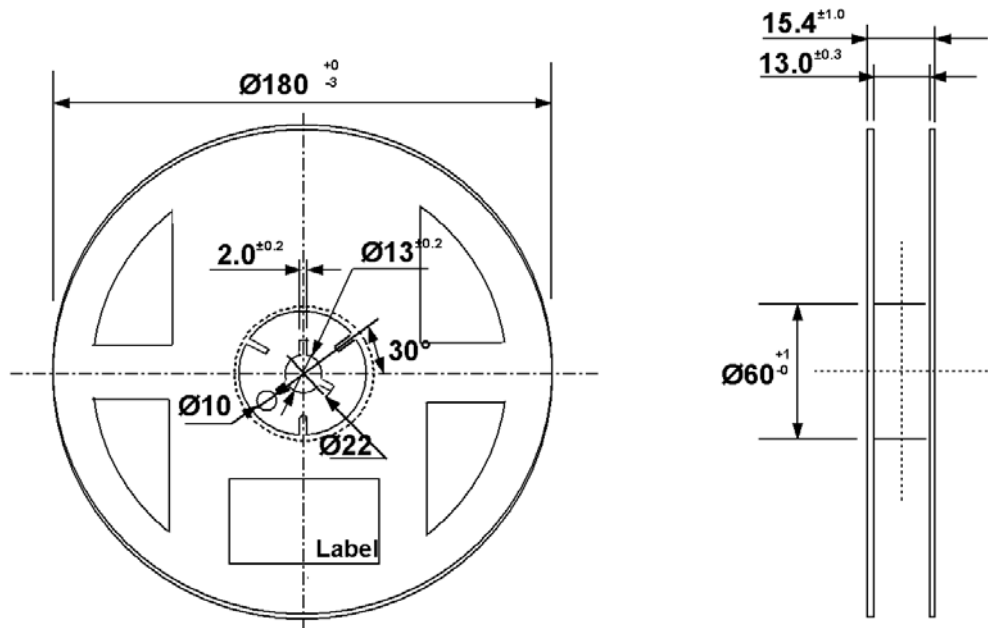
Start

More than 40 mm  
Unloaded tape

Mounted with  
Flash LED

More than (100~200)mm  
Unloaded tape

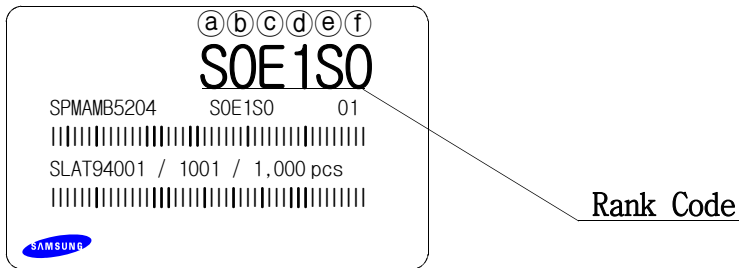
Leading part more than  
(200~400)mm



Tolerance  $\pm 0.2$ , Unit:mm

- (1) Quantity : The quantity/reel to be 1000pcs.
- (2) Cumulative Tolerance : Cumulative tolerance/10 pitches to be  $\pm 0.2$  mm
- (3) Adhesion Strength of Cover Tape : Adhesion strength to be 0.1–0.7N when the cover tape is turned off from the carrier tape at  $10^\circ\text{C}$  angle to be the carrier tape.
- (4) Packaging : P/N, Manufacturing data code no. and quantity to be indicated on a damp proof package.

## 9. Label Structure



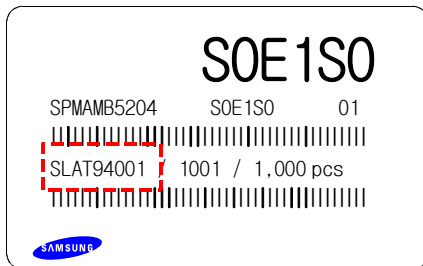
N.B) Denoted rank is the only example.

### Rank Code

- ⒶⒷ : Forward Voltage( $V_F$ ) Rank (refer to page. 3)
- ⒸⒹ : Wavelength Rank( $\lambda_D$ ) (refer to page. 3)
- ⒺⒻ : Luminous Intensity( $I_V$ ) Rank (refer to page. 3)

## 10 Lot Number

The Lot number is composed of the following characters

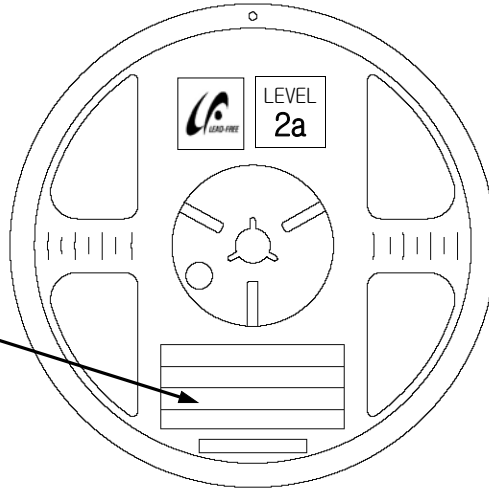
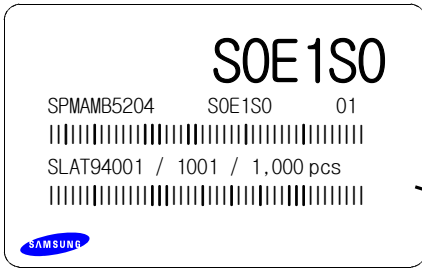


①②③④⑤⑥⑦⑧⑨ / 1ⒶⒷⒸ / 2,000 PCS

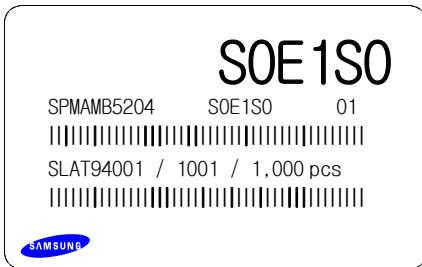
- ① : Production Site (S:SAMSUNG LED, GOSIN CHINA, I: Apro)
- ② : L (LED)
- ③ : Product State (A:Normality, B:Bulk, C:First Production, R:Reproduction, S:Sample)
- ④ : Year (T:2009, U:2010, V:2011...)
- ⑤ : Month (1 ~ 9, A, B)
- ⑥ : Day (1 ~ 9, A, B ~ V)
- ⑦⑧⑨ : SAMSUNG LED Product number (1 ~ 999)
- ⒶⒷⒸ : Reel Number (1 ~ 999)

# 11. Reel Packing Structure

## Reel



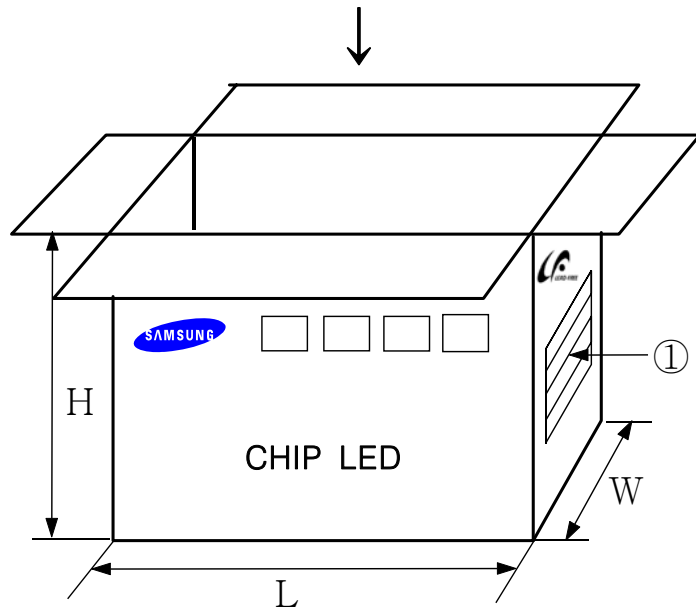
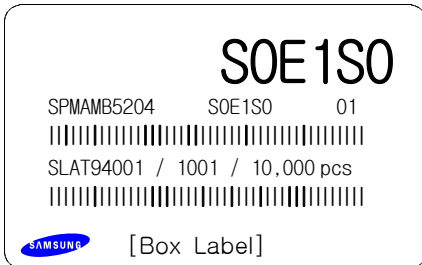
## Aluminum Vinyl Bag




Material : Paper(SW3B(B))

TYPE	SIZE(mm)		
	L	W	H
7inch	245	220	182

### ① SIDE



## 12. Aluminum Vinyl Bag



**CAUTION**

This bag contains  
**MOISTURE SENSITIVE DEVICES**

**LEVEL**

**2a**

SPMAMB5204 SOE1SO 01

|||||

SLAT94001 / 1001 / 1,000 pcs

|||||

1. Shelf life in sealed bag: 12 months at <math> < 40^{\circ}\text{C}</math> and <math> < 90\%</math> relative humidity (RH)
2. Peak package body temperature: 240 °C
3. After this bag is opened, devices that will be subjected to reflow solder or other high temperature processes must be:
  - a. Mounted within 672 hours at factory conditions of equal to or less than 30°C / 60% RH, or
  - b. Stored at <math> < 10\%</math> RH
4. Devices require bake, before mounting, if:
  - a. Humidity Indicator Card is > 65% when read at 23±5°C, or
  - b. 2a is not met.
5. If baking is required, devices must be baked for 1 hours at 60±5°C

Note: if device containers cannot be subjected to high temperature or shorter bake times are desired, reference IPC/JEDEC J-STD-033 for bake procedure,

Bag seal due date: \_\_\_\_\_  
(if blank, see code label)

Note: Level and body temperature by IPC/JEDEC J-STD-020



### ■ 주의 사항

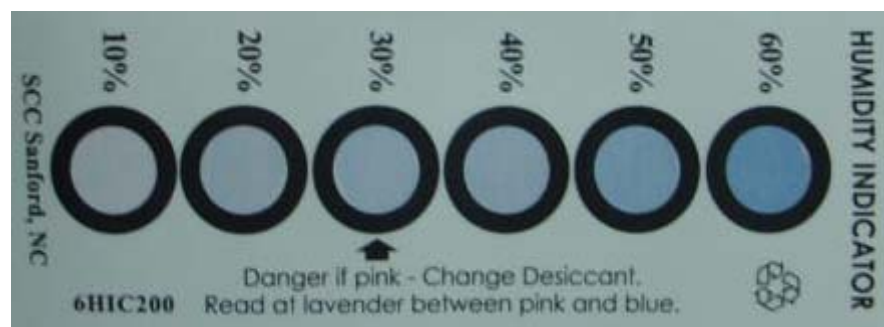
이 알루미늄 지퍼 백은 습기 및 정전기로부터 제품을 보호하기 위하여 제작되었습니다. 개봉 후에는 즉시 솔더 작업을 실시하는 것을 권장합니다.

습기 및 정전기로부터 제품을 보호 하기 위해서 개봉 후 사용하지 않는 자재는 본 팩에 넣어 보관 하시기 바랍니다. 사용하지 않는 자재를 본 팩에 넣을 때는 반드시 동봉된 드라이 팩과 함께 넣고 지퍼부분을 완전하게 밀봉하여 주시기 바랍니다.

### ■ Important

This Al Zipper bag is designed to protect the enclosed products from moisture and ESD. Once opened, the products should be soldered onto the printed circuit board immediately. When not in use, please do not leave the products unprotected by the Al Zipper Bag. To repack unused products., please ensure the zip-lock is completely sealed with the dry pack left inside.

## Silica gel & Humidity Indicator Card in Aluminum Vinyl Bag



## 13. Precaution for Use

- 1) For over-current-proof function, customers are recommended to apply resistors to prevent sudden change of the current caused by slight shift of the voltage.
- 2) This device should not be used in any type of fluid such as water, oil, organic solvent, etc. When washing is required, IPA is recommended to use.
- 3) When the LEDs illuminate, operating current should be decided after considering the ambient maximum temperature.
- 4) LEDs must be stored in a clean environment.  
If the LEDs are to be stored for 3 months or more after being shipped from SAMSUNG, they should be packed by a sealed container with nitrogen gas injected. (Shelf life of sealed bags: 12 months, temp. 0~40°C, 20~70%RH)
- 5) After storage bag is open, device subjected to soldering, solder reflow, or other high temperature processes must be:
  - a. Mounted within 168 hours (7 days) at an assembly line with a condition of no more than 30°C/60%RH,
  - b. Stored at <10% RH
- 6) Repack unused Products with anti-moisture packing, fold to close any opening and then store in a dry place.
- 7) Devices require baking before mounting, if humidity card reading is >60% at 23±5°C.
- 8) Devices must be baked for 24hours at 65±5°C, if baking is required.
- 9) The LEDs are sensitive to the static electricity and surge. It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs.

If voltage exceeding the absolute maximum rating is applied to LEDs, it may cause damage or even destruction to LED devices.

Damaged LEDs may show some unusual characteristics such as increase in leak current, lowered turn-on voltage, or abnormal lighting of LEDs at low current.

# 14. Hazard Substance Analysis



**Test Report No.** F690501/LF-CTSAYAA09-05676

**Issued Date:** March 09, 2009

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**To:** SAMSUNG ELECTRO-MECHANICS CO., LTD.  
 314, Maetan3-dong  
 Yeongtong-gu  
 Suwon-city  
 KYUNGGI-DO 442-373  
 Korea

The following merchandise was submitted and identified by the client as :

**Product Name** : 5252 Amber red  
**SGS File No.** : AYAA09-05676  
**Received Date** : March 02, 2009  
**Test Performing Date** : March 03, 2009  
**Test Performed** : SGS Testing Korea tested the sample(s) selected by applicant with following results  
**Test Results** : For further details, please refer to following page(s)  
**Comments** : By the applicant's specific request, the sampling and testing was performed only for the part indicated in the photo without disassembly.

Pluto Kim  
 Cindy Park  
 Jinee Song/ Testing Person

SGS Testing Korea Co. Ltd.

Jeff Jang / Chemical Lab Mgr

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**Test Report No.** F690501/LF-CTSAYAA09-05676

**Issued Date:** March 09, 2009

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**Sample No.** : AYAA09-05676.001

**Sample Description** : 5252 Amber red

**Item No./Part No.** : N/A

**Heavy Metals**

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321:2008, ICP-OES	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321:2008, ICP-OES	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321:2008, ICP-OES	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	With reference to IEC 62321:2008, UV-VIS	1	N.D.

**Flame Retardants-PBBs/PBDEs**

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.

- NOTE: (1) N.D. = Not detected.(<MDL)  
 (2) mg/kg = ppm  
 (3) MDL = Method Detection Limit  
 (4) - = No regulation  
 (5) \*\* = Qualitative analysis (No Unit)  
 (6) Negative = Undetectable / Positive = Detectable

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F052 Version3

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**Test Report No.** F690501/LF-CTSAYAA09-05676

**Issued Date:** March 09, 2009

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**Sample No.** : AYAA09-05676.001

**Sample Description** : 5252 Amber red

**Item No./Part No.** : N/A

**Halogen Contents**

Test Items	Unit	Test Method	MDL	Results
Fluorine(F)	mg/kg	BS EN 14582:2007 , IC	30	N.D.
Bromine(Br)	mg/kg	BS EN 14582:2007 , IC	30	N.D.
Chlorine(Cl)	mg/kg	BS EN 14582:2007 , IC	30	N.D.
Iodine(I)	mg/kg	BS EN 14582:2007 , IC	50	N.D.

**Other(s)**

Test Items	Unit	Test Method	MDL	Results
PFOS(Perfluorooctane Sulfonates-Acid/Metal Salt/Amide)	mg/kg	US EPA 3540C, LC/MS	1	N.D.

Picture of Sample as Received:



\*\*\* End \*\*\*

- NOTE:
- (1) N.D. = Not detected.(<MDL)
  - (2) mg/kg = ppm
  - (3) MDL = Method Detection Limit
  - (4) - = No regulation
  - (5) \*\* = Qualitative analysis (No Unit)
  - (6) Negative = Undetectable / Positive = Detectable

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